

Attny. Docket No.: 2003-0395/N1085-90166

REMARKS

1. Claims 9, 10, and 29-34 are pending and stand withdrawn in the application. This paper adds claims 35-42 and cancels claims 9, 10, and 29-34.

Reconsideration of this application is respectfully requested.

2. Claims 9, 10, and 29-34 stand withdrawn as being directed to an invention that is independent or distinct from the invention originally claimed. In support of this restriction, the examiner argues "claimed 29-34 pertain to a method including a specific flow ratio and deposition rate; originally elected claims pertained to a method of forming an oxide to an acceptable thickness."

The undersigned attorney conducted a telephone interview with Examiner Schillinger on July 12, 2006 to discuss this restriction requirement. Examiner Schillinger explained that the method of claims 9, 10, and 29-34 is considered independent or distinct from the invention originally claimed because the limitation "continuing said deposition until an acceptable film thickness of said carbon doped SiO₂ film is reached" was deleted from claims 9, 10, and 29-34 while the limitations "organosilane" and "flow rate ratio of about 1:1.5:6" or "deposition rate of the carbon doped SiO₂ film is from about 5000 to 8000 Angstroms per minute" were added to the claims.

The undersigned attorney pointed out that the specific flow ratio and deposition rate were recited in original claims 7 and 10, respectively, and that dimethylsilane, trimethylsilane, and tetramethylsilane, recited in the original claims are organosilanes. Examiner Schillinger, however, did not agree to withdraw the restriction requirement.

In the interest of advancing the prosecution of this application, claims 9, 10, and 29-34 have been cancelled herein without prejudice or disclaimer of the subject matter contained therein. The applicants reserve the right to refile claims 9, 10, and 29-34 in a divisional application. It is expected that claims 9, 10, and 29-34, in such a divisional application, will not be subject to a double patenting rejection in light of new claims 35-42, which have been drafted to recite the limitation "continuing said deposition until an acceptable film thickness of said carbon doped SiO₂ film is reached" that was deleted in claims 9, 10, and 29-34, and to delete the term "organosilane" that was added to claims 9, 10, and 29-34.

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3. Claim 2 stood rejected in the September 30, 2005 Office Action under 35 U.S.C. 112, second paragraph because it contained trademarks/trade names.

This rejection is moot in view of the cancellation of claim 2 in the previous response. Accordingly, withdrawal of this rejection is respectfully requested.

4. Claims 1-10 stood rejected in the September 30, 2005 Office Action under 35 U.S.C. 102(e) as being clearly anticipated by U.S. Patent 6,541,397 B1 to Bencher.

In response, claim 1 was cancelled in the previous response and is now replaced with claim 35 which requires among other elements: "flowing oxygen, argon, and one of dimethylsilane, trimethylsilane, and tetramethylsilane, over the substrate at a flow rate ratio of about 1:1.5:6". The flow rate ratio of about 1:1.5:6 was recited in original claim 7.

Contrary to the examiner's assertion, Bencher fails to expressly or inherently describe the claimed flow rate ratio. Although the examiner relies on column 5, lines 45-55 of Bencher for the flow rate ratio of about 1:1.5:6, Bencher merely states:

A preferred silicon, oxygen, and carbon layer is deposited in one embodiment by supplying trimethylsilane or 1,3,5,7-tetramethylcyclotetrasiloxane to a plasma processing chamber at a flow rate between about 10 and about 1000 standard cubic centimeters per minute (sccm) with an oxidizing gas supplied to the processing chamber at a flow rate between about 10 sccm and about 1000 sccm. An inert gas, such as helium, argon, or combinations thereof, is also supplied to the chamber at a flow rate between about 50 sccm and about 5000 sccm. The chamber pressure is maintained between about 100 milliTorr and about 15 Torr. The substrate surface temperature is maintained between about 100° C. and about 450° C. during the deposition process.

Thus, Bencher does not expressly or inherently describe the flow rate ratio of about 1:1.5:6, as presently claimed in new claim 35. Accordingly, claim 35 is allowable.

Original dependent claims 3, 4, 6 and 8 have been respectively replaced by new dependent claims 36-39, which have been drafted to be consistent with new independent claim 35, from which they depend. Applicant believes that claims 36-39 are allowable for at least the same reasons as stated for claim 35.

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Further, claim 39 additionally requires: "the carbon doped SiO₂ film is deposited to a thickness of about 4000 to 8000 Angstroms". The examiner asserts that column 9, lines 60-65 of Bencher describes the acceptable thickness is from 4000 to 8000 Angstroms. Bencher merely states in column 9, lines 60-65:

The first dielectric layer 112 of interlayer dielectric material is deposited on the first silicon carbide barrier layer 110 by oxidizing an organosilane or organosiloxane, such as trimethylsilane, to a **thickness of about 5,000 to about 15,000 Å, depending on the size of the structure to be fabricated. (Emphasis added.)**

An example of a low dielectric constant material that may be used as an interlayer dielectric material is Black Diamond

Hence, the claimed thickness range is clearly different from the thickness range described by Bencher. Accordingly, claim 39 is allowable over Bencher for this reason also.

With respect to claims 40 and 41, which now depend upon claim 35 and recite additional features of the invention, applicant believes these claims to be allowable for at least the same reasons as stated for claim 35.

Further, claim 41 additionally requires: "the deposition rate of said carbon doped SiO₂ film is from about 5000 to 8000 Angstroms per minute". The examiner asserts that column 8, lines 10-20 of Bencher describes this feature. Bencher merely states in column 8, lines 10-20:

The amorphous carbon layer is then deposited from the processing gas using the following deposition process parameters. The substrate is maintained at a substrate temperature between about 100° C. and about 500° C., a chamber pressure is maintained between about 1 Torr and about 20 Torr, the hydrocarbon gas (C_xH_y) has a flow rate between about 50 sccm and about 500 sccm for a 200 mm substrate, a plasma is generated by applying a RF power of between about 3 W/cm² and about 20 W/cm², or between about 1000 watts (w) and about 6000 W for a 200 mm substrate, with a gas distributor being between about 300 mils and about 600 mils from the substrate surface. **The above process parameters provide a typical deposition rate for the amorphous carbon layer in the range of about 100 Å/min to about 1000 Å/min... (Emphasis added.)**

Hence, the claimed deposition rate range is clearly outside the deposition rate range described by Bencher. Accordingly, claim 41 is allowable over Bencher for this reason also.

In view of the foregoing, withdrawal of this rejection is respectfully requested.

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5. New independent claim 42, among other elements, recites: "wherein the deposition rate of the carbon doped SiO₂ film is from about 5000 to 8000 Angstroms per minute." As discussed above, Bencher describes a much different deposition rate of about 100 Angstroms per minute to about 1000 Angstroms per minute. Accordingly, claim 42 is allowable over Bencher.

6. Favorable reconsideration of this application is respectfully requested as it is believed that all outstanding issues have been addressed herein and, further, that claims 35-42 are in condition for allowance. Should there be any questions or matters whose resolution may be advanced by a telephone call, the examiner is cordially invited to contact applicants' undersigned attorney at his number listed below.

7. As shown in the attached Fee Determination Record sheet, no additional fee is required for submission of this amendment. However, if a fee is required, the Commissioner is hereby authorized to charge any additional fee required under 37 CFR 1.16 and any patent application processing fees under 37 CFR 1.17, which are associated with this communication, or credit any overpayment to Deposit Account No. 04-1679.

Respectfully submitted,

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